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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/698,174	10/30/2000	Tom Francke	1920-0111P	3570

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EXAMINER
ZIMMERMAN, GLENN

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 12/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/698,174	FRANCKE ET AL.	
	Examiner	Art Unit	
	Glenn Zimmerman	2879	

-- The MAILING DATE of this communication appears on th cover sheet with th correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☒ Claim(s) *10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 October 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☒ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Priority

Acknowledgment is made of applicant's claim for foreign priority based on an application filed the United States on October 30, 2000. It is noted, however, that applicant has not filed a certified copy of the 0002080-0 application as required by 35 U.S.C. 119(b).

The examiner has the certified copy but has no cover page with date to verify the date given in the declaration. This cover page would be appreciated. The cover page usually shows the ribbon, if any, along with the application number and the date.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: Reference number 59 on page 10 line 11 and reference number 55 on page 8 line 12. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance. It is assumed that reference number 55 should be reference number 51.

Specification

The disclosure is objected to because of the following informalities: On page 10 line 14, the examiner suggests changing "materia" to "material".

Appropriate correction is required.

Claim Objections

Claim 10 is objected to because of the following informalities: On line 1 the examiner suggest changing "Claims" to "claim". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 11, 29 and 30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as

to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 11 recites the broad recitation lower than 500 mrad, and the claim also recites 0.05-500 mrad and 0.50-50 mrad which are the narrower statements of the range/limitation.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 29 recites the broad

recitation lower than 500 mrad, and the claim also recites 0.05-500 mrad and 0.50-50 mrad which are the narrower statements of the range/limitation.

Regarding claim 30, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

A 112 2nd paragraph rejection has been determined for claim 11, as written about above. However, a further evaluation of the claim will be done while interpreting ", preferably in the interval 0.05-500 mrad, and more preferably in the interval 0.50-50 mrad" as "".

A 112 2nd paragraph rejection has been determined for claim 29, as written about above. However, a further evaluation of the claim will be done while interpreting ", preferably in the interval 0.05-500 mrad, and more preferably in the interval 0.50-50 mrad" as "".

A 112 2nd paragraph rejection has been determined for claim 30, as written about above. However, a further evaluation of the claim will be done while interpreting "such as" as ", which is".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1,2, 25 and 26 rejected under 35 U.S.C. 102(b) as being anticipated by Tosswill U.S. Patent 4,608,519.

Regarding claim 1,2, 25 and 26, Tosswill discloses an apparatus for detection of radiation comprising:

- a photocathode layer **(photoconductor Fig. 2ref. 27)** adapted to release photoelectrons in dependence on incident radiation;
- a radiation entrance **(circular input window ref. 16)** arranged such that a beam of radiation can be entered into the apparatus through the radiation entrance and can impinge on the photocathode layer at grazing incidence;
- an electron avalanche amplifier adapted to avalanche amplify photoelectrons released from the photocathode layer **(col. 3 lines 35-68)**; and
- a readout arrangement **(phosphor screen ref. 22)** adapted to detect avalanche amplified electrons from the amplifier.

Claims 1-3, 5-12, 14, 17, 19-23 and 25-29 is rejected under 35 U.S.C. 102(b) as being anticipated by Johnson U.S. Patent 4,339,659.

Regarding claims 1, 2, 25 and 26, Johnson discloses an apparatus for detection of radiation comprising:

- a photocathode layer **(photocathode Fig. 1 ref. 7 or CsI phosphor screen or scintillator ref. 6)** adapted to release photoelectrons in dependence on incident radiation;

- a radiation entrance **(energy transparent input window ref. 3)** arranged such that a beam of radiation can be entered into the apparatus through the radiation entrance and can impinge on the photocathode layer at grazing incidence;
- an electron avalanche amplifier adapted to avalanche amplify photoelectrons released from the photocathode layer **(photoelectron and microchannel plate Fig. 1 ref. e and 4 respectively)**; and
- a readout arrangement **(readout device ref. 9)** adapted to detect avalanche amplified electrons from the amplifier.

  Light coming in through the entrance can clearly hit the photocathode on the side and thereby show a grazing of the photocathode.

Regarding claims 3 and 27, Johnson discloses the apparatus as claimed in claim 1 wherein the radiation entrance is arranged such that the beam of radiation can impinge on a first surface, a back surface, of the photocathode layer; and the photocathode layer is adapted to release photoelectrons from a second surface, a front surface, in dependence thereon, the first and second surfaces being opposite to each other. Figure 2 clearly shows that some of the radiant energy makes it through the photocathode layer to the back surface, to hit the phosphor therefore causing electrons to be emitted on the front surface of the photocathode. This limitation clearly is met by grazing the surface.

Regarding claims 5 and 28, Johnson discloses the apparatus as claimed in claim 1 wherein the photocathode layer is of a material having a work function, which is lower than the photon energy of the radiation beam. This is inherent as no electrons would be emitted if the material work function was higher than the photon energy. The phosphor is made of cesium antimony.

Regarding claim 6, Johnson discloses the apparatus as claimed in claim 1 wherein the photocathode layer is of CsI **(phosphor screen or scintillator composed of cesium iodide ref. 6)** or an earth metal.

Regarding claim 7, Johnson discloses the apparatus as claimed in Claim 1 wherein the photocathode layer is provided with a protective layer **(photocathode cesium antimony ref. 7)**, the protective layer being transparent to electrons **(col. 2 lines 43-61)**; and the photocathode layer is adapted to release photoelectrons through the protective layer **(col. 2 lines 52-56)** .

Regarding claim 8, Johnson discloses the apparatus as claimed in claim 7 wherein the protective layer is opaque to light **(col. 2 lines 52-56)**. The radiant quanta gets through the cesium-antimony layer, but the light quanta created by the CsI layer is converted to photoelectrons.

Regarding claim 9, Johnson disclose the apparatus as claimed in claim 9 wherein the protective layer is provided with a thin, preferably metallic, layer, which is transparent to electrons and opaque to light. The cesium-antimony layer is a metal as it is an alloy. The word "thin" is a relative term, and clearly the layer is thin from Figures 1

and 2 and the fact that radiant energy can get through the cesium-antimony layer **(col. 2 lines 52-56)**.

Regarding claim 10, Johnson disclose the apparatus as claimed in claims 7 wherein the protective layer is transparent to the radiation beam **(col. 2 lines 52-56; Fig. 2)**.

Regarding claims 11 and 29, Johnson disclose the apparatus as claimed in claim 1 wherein the radiation entrance is arranged such that the beam of radiation can be entered into the apparatus and can impinges on the photocathode layer at a grazing angle, which is lower than 500 mrad. Clearly the radiation can impinge at angles lower than 500 mrad

Regarding claim 12, Johnson discloses the apparatus as claimed in claim 1 wherein the radiation entrance is provided with a window, which is transparent to the radiation beam **(radiant energy transparent input window ref. 3)**.

Regarding claims 14 and 17, Johnson discloses the apparatus as claimed in claim 1 wherein the electron avalanche amplifier includes an array of avalanche amplification regions filled with an avalanche amplification medium **(microchannel palte Fig. 1 ref. MCP; col. 2 lines 43-61)**.

Regarding claim 19, Johnson discloses the apparatus as claimed in claim 1 wherein the electron avalanche amplifier includes an avalanche cathode **(transparent mesh Fig. 1)** and an avalanche anode **(input electrode ref. 5)** arrangement respectively.

Regarding claim 20, Johnson discloses the apparatus as claimed in claim 19 wherein the avalanche cathode is permeable to electrons. The mesh has a negative charge **(Fig. 1)** on it, so therefore it is permeable to electrons.

Regarding claim 21, Johnson discloses the apparatus as claimed in claim 19 wherein the avalanche anode and readout arrangements are comprised of a single arrangement. It is a single arrangement as there is only one arrangement.

Regarding claims 22 and 23, Johnson discloses the apparatus as claimed in claim 1 wherein the readout arrangement includes an array of readout elements **(col. 2 lines 27-34)**.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson U.S. Patent 4,339,659 in view of Breskin et al. U.S. Patent 5,192,861.

Regarding claim 4, Johnson teaches all the limitations of claim 4, but fails to teach wherein the photocathode layer is 0.00001-0.01 mm thick. Breskin et al. in the analogous art teach wherein the photocathode layer is 0.00001-0.01 mm thick **(col. 19 lines 23-36)**. Additionally, Breskin et al. teach incorporation of such a thickness to

improve the structure by providing good X-rays to photoelectron conversion for the avalanche for readout **(col. 19 lines 23-36; abstract; Fig. 1A readout)**.

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have wherein the photocathode layer is 0.00001-0.01 mm thick in image converter of Johnson since such a modification would provide good photoelectric conversion for X-rays as taught by Breskin et al.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson U.S. Patent 4,339,659 in view of Seppi et al. U.S. Patent 5,692,507.

Regarding claim 13, Johnson teaches all the limitations of claim 13, but fails to teach comprising a collamator arranged in front of the radiation entrance. Seppi et al. in the analogous art teach a collamator arranged in front of the radiation entrance **(col. 10 lines 66-67 and col. 11 lines 1-3)**. Additionally, Seppi et al. teach incorporation of such a collamator to improve the structure by reducing X-ray scatter and required dose **(col. 12 lines 40-46)**.

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use a collamator in the image converter of Johnson since such a modification would reduce X-ray scatter and required dose as taught by Seppi et al.

Claims 15 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson U.S. Patent 4,339,659 in view of Jacobs et al. U.S. Patent 3,710,125.

Regarding claims 15 and 30, Johnson teaches all the limitations of claim 15, but fails to teach the avalanche amplification medium is a gas or a gas mixture. Jacobs et

al. in the analogous art teach the avalanche amplification medium is a gas or a gas mixture **(col. 8 lines 8-15)**. Additionally, Jacobs et al. teach incorporation of such an avalanche amplification gas to improve amplification and provide for avalanche **(col. 8 lines 8-15)**.

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use gas in the of image converter of Johnson since such a modification would provide avalanche and amplification as taught by Jacobs et al.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson U.S. Patent 4,339,659 in view of Pitts et al. U.S. Patent 5,602,397.

Regarding claim 16, Johnson teach all the limitations of claim 16, but fails to teach wherein the avalanche amplification medium is a liquid. Pitts et al. in the analogous art teach wherein the avalanche amplification medium is a liquid **(col. 11 lines 1-17)**. Additionally, Pitts et al. teaches incorporation of such a liquid to improve the device by allowing operation at lower temperatures **(col. 11 lines 1-17)**.

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use liquid avalanche amplification medium in the image converter of Johnson since such a modification would allow for operation at lower temperatures i.e. temperatures of liquid argon and liquid xenon as taught by Pitts et al.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson U.S. Patent 4,339,659 in view of Solberg et al. U.S. Patent 5,614,722.

Regarding claim 18, Johnson teaches all the limitations of claim 18, but fails to teach the individual avalanche regions are separated from each other by a dielectric. Solberg et al. in the analogous art teach the individual avalanche regions are separated from each other by a dielectric **(dielectric substrate Fig. 4 ref. 52; col. 4 lines 5-10)** . Additionally, Solberg et al. teaches incorporation of such a dielectric separator to improve the reduction of photon feedback **(col. 9 lines 14-43)**. The dielectric separator also provides for a good insulated divider for avalanche anode/cathode configurations **(col. 8 lines 46-67; col. 9 lines 1-13)**.

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use a dielectric separator in image converter of Johnson since such a modification would reduce photon feedback and also provides for a good insulated divider for avalanche anode/cathode configurations as taught by Solberg et al.

Claims 24 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson U.S. Patent 4,339,659 in view of Rieke U.S. Patent 4,493,096 in view of Seppi et al. U.S. Patent 5,692,507.

Regarding claims 24 and 31, Johnson teaches all the limitations of claim 24, but fails to teach an X-ray source. Rieke in the analogous art teaches an X-ray source **(Fig. 1 ref. 1)**. Additionally, Rieke teaches incorporation of such a source to improve the structure by allowing for an imaging apparatus **(col. 3 lines 4-5)**.

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use an X-ray source in the image converter of

Johnson since such a modification would allow for an imaging apparatus as taught by Rieke.

Regarding claims 24 and 31, Johnson teaches all the limitations of claim 24, but fails to teach means for forming an essentially planar X-ray beam located between the X-ray source and an object to be imaged. Seppi et al. in the analogous art teaches a means for forming an essentially planar X-ray beam located between the X-ray source and an object to be imaged **(pre-patient collimator Fig. 1 ref. 34 and post-patient collimator ref. 36)**. Additionally, Seppi et al. teach incorporation of such a means to reduce scatter **(col. 12 line 41 and col. 13 lines 31-33)**.

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use a means for forming an essentially planar X-ray beam in the image converter of Johnson since such a modification would provide an improved method of x-ray imaging in which the effects of scatter are reduced as taught by Seppi et al.

Claims 24 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tosswill U.S. Patent 4,608,519 in view of Rieke U.S. Patent 4,493,096 in view of Seppi et al. U.S. Patent 5,692,507.

Regarding claims 24 and 31, Tosswill teaches all the limitations of claim 24, but fails to teach an X-ray source. Rieke in the analogous art teaches an X-ray source **(Fig. 1 ref. 1)**. Additionally, Rieke teaches incorporation of such a source to improve the structure by allowing for an imaging apparatus **(col. 3 lines 4-5)**.

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use an X-ray source in the image converter of Tosswill since such a modification would allow for an imaging apparatus as taught by Rieke.

Regarding claims 24 and 31, Tosswill teaches all the limitations of claim 24, but fails to teach means for forming an essentially planar X-ray beam located between the X-ray source and an object to be imaged. Seppi et al. in the analogous art teaches a means for forming an essentially planar X-ray beam located between the X-ray source and an object to be imaged **(pre-patient collimator Fig. 1 ref. 34 and post-patient collimator ref. 36)**. Additionally, Seppi et al. teach incorporation of such a means to reduce scatter **(col. 12 line 41 and col. 13 lines 31-33)**.

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use a means for forming an essentially planar X-ray beam in the image converter of Tosswill since such a modification would provide an improved method of x-ray imaging in which the effects of scatter are reduced as taught by Seppi et al.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Enstrom et al. U.S. Patent 3,814,996 disclose Photocathodes. Enstrom discloses useful information about cesium-antimony **(col. 1 lines 49-59)**. Kaes et al. U.S. Patent 3,912,522 disclose a Silver Containing, Semiconductive Glass of

Improved Resistivity and Secondary Emission and Process of Making It. Kaes et al. discloses avalanche amplification **(Fig. 1; col. 1 lines 14-26)**.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Glenn Zimmerman whose telephone number is (703) 308-8991. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703) 305-4794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is n/a.

Glenn Zimmerman
December 11, 2002

ASHOK PATEL
PRIMARY EXAMINER